

Report from  
the ILC International Development Team  
Community Snowmass Study, Seattle, 17-26 July 2022

Tatsuya NAKADA (EPFL, Lausanne Switzerland)  
Chair of the IDT Executive Board

What is the International Development Team (IDT)?

The IDT was established by the ICFA in August 2020, **to support the Japanese HEP community effort to host the ILC as a global project (since 2012)**, by paving a way for the preparatory phase of the ILC. It is hosted at KEK, but work has been so far done remotely, naturally...

*NB:*

*In March 2019, MEXT expressed their general interest on the ILC, but did not refer to anything on hosting (and remains so till now).*

**ICFA**

**ILC International Development Team**

**Executive Board**

<i>Americas Liaison</i>	Andrew Lankford (UC Irvine)
<i>Working Group 2 Chair</i>	Shinichiro Michizono (KEK)
<i>Working Group 3 Chair</i>	Hitoshi Murayama (UC Berkeley/U. Tokyo)
<i>Executive Board Chair and Working Group 1 Chair</i>	Tatsuya Nakada (EPFL)
<i>KEK Liaison</i>	Yasuhiro Okada (KEK)
<i>Europe Liaison</i>	Steinar Stapnes (CERN)
<i>Asia-Pacific Liaison</i>	Geoffrey Taylor (U. Melbourne)

**Working Group 1**  
Pre-Lab Setup

**Working Group 2**  
Accelerator

**Working Group 3**  
Physics & Detectors

## What is the International Development Team (IDT)?

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The ILC preparatory phase consists of

- **completion of engineering design studies**  
⇒ in the scope of the IDT = Pre-lab proposal
- **governmental negotiations for the distribution of the cost and responsibilities for the construction and operation of the ILC**  
⇒ beyond the scope of the IDT, **but could help triggering the discussion**

## What did IDT do so far?

- **Produced Pre-lab Proposal** in June 2021 and working towards realisation.
- **Organised a remote workshop**, ILCX2021, in October 2021 to promote the physics potential of ILC in the HEP community and beyond.
- Holding regular bi-weekly meetings of accelerator working group and physics & detector working group

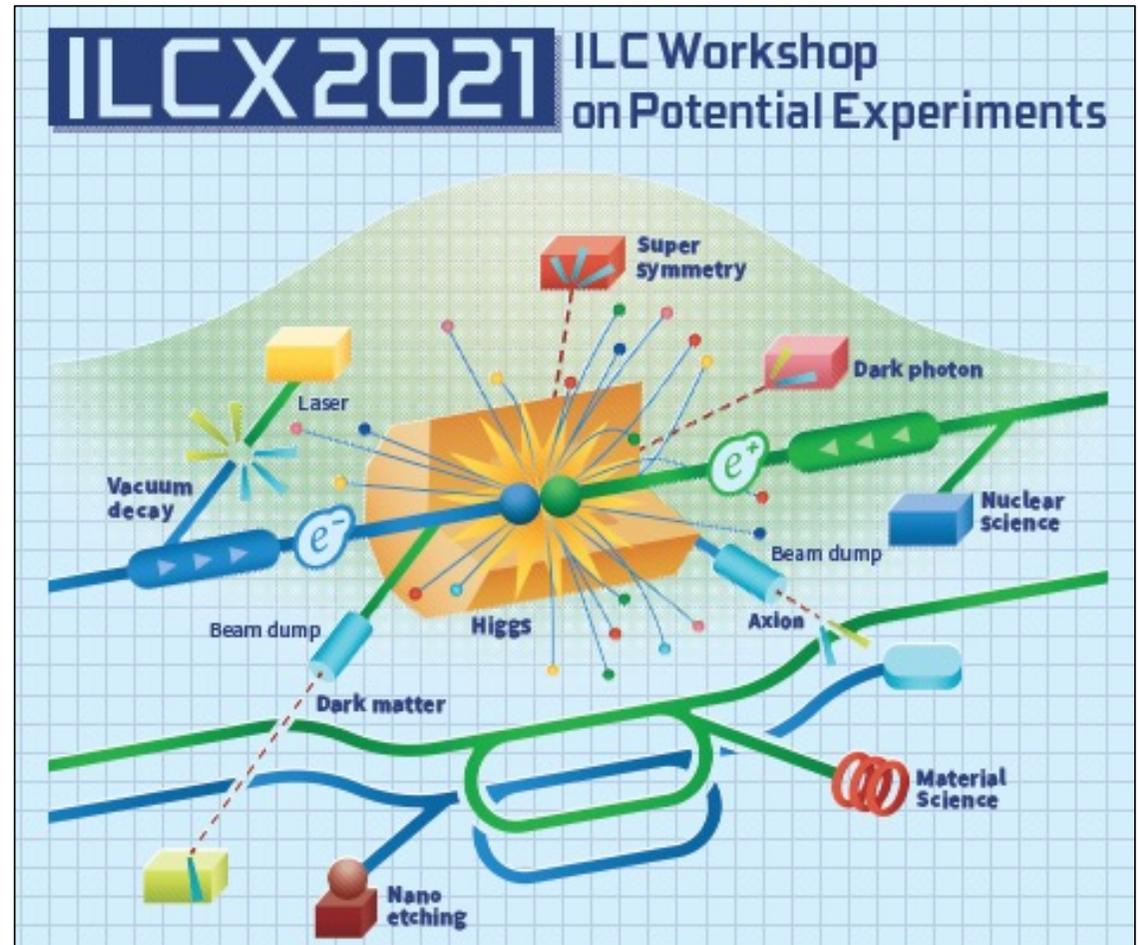
## Proposal for the ILC Preparatory Laboratory (Pre-lab)

International Linear Collider  
International Development Team

1 June 2021

### Abstract

During the preparatory phase of the International Linear Collider (ILC) project, all technical development and engineering design needed for the start of ILC construction must be completed, in parallel with intergovernmental discussion of governance and sharing of responsibilities and cost. The ILC Preparatory Laboratory (Pre-lab) is conceived to execute the technical and engineering work and to assist the inter-governmental discussion by providing relevant information upon request. It will be based on a worldwide partnership among laboratories with a headquarters hosted in Japan. This proposal, prepared by the ILC International Development Team and endorsed by the International Committee for Future Accelerators, describes an organisational framework and work plan for the Pre-lab. Elaboration, modification and adjustment should be introduced for its implementation, in order to incorporate requirements arising from the physics community, laboratories, and governmental authorities interested in the ILC.



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The MEXT reaction has not been positive toward the Pre-lab Proposal

⇒ Prospect for the international funding for the ILC itself is necessary before

The MEXT Advisory Panel for the ILC reached its conclusions in February 2022

- Transition to Pre-lab, with the proposed scale and coupled to the Japanese government indicating its interest in hosting the ILC, is premature.
- Recommend to continue accelerator R&D and re-evaluate the roadmap of the ILC with consideration of the global situation.

(See M. Yamauchi talk)

## What did IDT communicate to the ICFA in March 2022?

The IDT analysis:

- The current deadlock in the international discussion is caused by **different understandings between the Japanese government and potential partner countries on how a “global project” should proceed.**
  - To be noted;
    - There has been **no global accelerator project**, only those with international participation, such as HERA, LHC, LBNF/PIP-II, etc.
    - Unlike its precursors, i.e. JLC, NLC and TESLA, ILC **started as a global project with equal participations of three regions without predestined site or host.**
- ILC should remain as a viable option for a Higgs Factory. **Japan could offer unique opportunity for continuing necessary R&D.**

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  - ILC should remain as a viable option for a Higgs Factory. **Japan could offer unique opportunity for continuing necessary R&D.**

ICFA decision in their meeting in March 2022: (See S. Henderson talk)

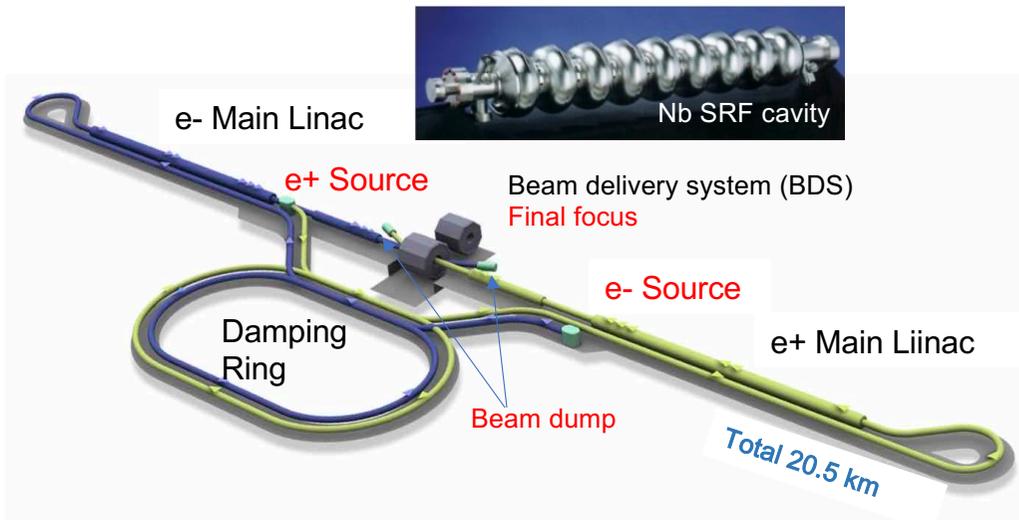
**Give a year and judge whether it makes a positive development...**

# What are the current IDT activities ? I

## International network for the ILC related technology development

- Making further advances in the development of ILC related technologies in view of providing more solid bases for the ILC engineering design and opportunities for other accelerator applications.
- The work programme derived from the work packages in the ILC Pre-lab proposal by selecting technically most critical items and those that require long time to develop.
- Based on collaboration agreements between KEK and interested laboratories worldwide.
- The execution of the work will be managed by the each collaborations. The IDT will provide the overall coordination work including
  1. Technical description of the work programme completed
  2. Definition of deliverables and required resources in progress
  3. Distribution of the deliverables and defining the timeline require substantially
  4. Help drafting of MoU and research agreements increased funding @KEK
  5. Follow up and monitoring of the overall project (See M. Yamauchi talk)
- Anticipated start in April 2023, the start of the Japanese Fiscal Year 2023 for a period of two to four years depending on the work.

# Time critical WPs



Item	Parameters
C.M. Energy	250 GeV
Length	20km
Luminosity	$1.35 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
Repetition	5 Hz
Beam Pulse Period	0.73 ms
Beam Current	5.8 mA (in pulse)
Beam size (y) at FF	<b>7.7</b> nm@250GeV
SRF Cavity G.	<b>31.5</b> MV/m ( <b>35</b> MV/m)
$Q_0$	$Q_0 = 1 \times 10^{10}$

Area	Role	Topics	WPs
Sources	Produce the <b>required amount</b> of e-/e+	Undulator e+ source e-Driven e+ source e- source	WP-prime 6/7/11 WP-prime 8/9/10/11 WP-prime 4
SRF	Accelerate e-/e+ to the <b>required energy</b> at Main Linacs	High performance cavity Cryomodule design Crab cavity	WP-prime 1 WP-prime 2 WP-prime 3
Nano-beam	Narrow the beam to obtain a <b>required luminosity</b>	Final focus Damping ring Beam dump	WP-prime 15/16 WP-prime 12/14 WP-prime 17

## What are the current IDT activities ? II

Setting up the IDT International Expert Panel, for

### Step 1 **Developing a path for a global project adoptable for the ILC:**

Establish the full lifecycle of an accelerator global project, adoptable to the ILC

Identify decision points and decision makers in the lifecycle

Identify associated responsibilities for the decision makers

Identify consequence of those decisions.

Share this idea with the government authorities (CA, CERN, DE, ES, FR, GB, IT, JP, US and possibly others)

Produce a discussion document summarising the emerging consensus

### Step 2 **Developing the ILC decision roadmap by adopting this path**

Adapting the ILC realisation to the process described in the discussion document

Achieving the consensus among the government authorities for the adaptation.

Producing a second discussion document

After this exercise, the governments might be in a better position to discuss the ILC, which could lead us to the Pre-lab and beyond.

# IDT International Expert Panel members

## Panel members

Ursula Bassler (FR)  
Philip Burrows (GB)  
Beate Heinemann (DE)  
Stuart Henderson (US, ICFA Chair)  
Karl Jacobs (DE, EFCA Chair)  
Andrew Lankford (US, IDT-EB Americas)  
Nadia Pastrone (IT)  
Antonio Pich (ES)  
Steinar Stapnes (CERN, IDT-EB Europe)  
Nigel Smith (CA)  
Geoffrey Taylor (AU, IDT-EB Asia-Pacific)  
Katsuo Tokushuku (JP)

## Core Group

Andrew Lankford  
Steinar Stapnes  
Geoffrey Taylor

## Chair

Tatsuya Nakada (IDT-EB Chair)

## Scientific Secretary

Wataru Ootani (IDT EB Scientific Secretary)

Endorsed by the ICFA together with its charge

What is the goal in spring 2023?

- **The International Network** for the ILC related technology development is ready to start or even has started.
- **The International Expert Panel** makes a significant advancement in the discussion **for Step 1**

**Your support would be needed!**